in said molecular alignment film in correspondence to said first electrode and a second region in said molecular alignment film in correspondence to said second electrode, said first and second regions being formed by ultraviolet irradiation and inducing said pre-tilt angle in said liquid crystal molecules located adjacent to said first and second regions.

REMARKS

Attached hereto is a marked-up version of the changes made to the specification and claims by the current amendment. The attached page is captioned "**Version with markings to show changes made**."

As a preliminary matter, applicants appreciate the indication that claim 4 contains allowable subject matter. Claim 5 depends from claim 4, and is presumed to be allowable, as well.

Claim 1 stands rejected on the basis of the admitted prior art and Walton, and claims 2-3 stand rejected on the basis of the admitted prior art, Walton and Lien. Applicants respectfully traverse these rejections because none of the references, alone or in combination, disclose or suggest a liquid crystal display device in which first and second electrodes are separated by a space in a pixel, and are provided with protrusions, as in amended claim 1 and new claim 6.

The present invention provides liquid crystal display device having improved response speed. In order to achieve this object, the present invention provides a construction as set forth in amended claim 1 as well as in new claim 6.

According to claim 1, pre-tilting is caused in the liquid crystal molecules locally in a limited area of the liquid crystal display substrate by first and second projections. As the first and second projections are provided on first and second electrodes, which interrupt the optical beam, and the pixels include the space between the electrodes, there is no decrease of transmittance of the liquid crystal panel even if the first and second projections are formed by a low-cost resist material.

According to the subject matter of claim 6, the same effect is achieved easily by means of ultraviolet radiation applied selectively to the molecular alignment film. Thereby, sticking of images can be eliminated as a result of change of conductivity associated with such ultraviolet radiation.

Walton teaches a VA-mode liquid crystal display device having pre-tilt in the liquid crystal molecules. In Walton, however, it seems that the pre-tilt is provided over the entire surface of the substrate uniformly. As noted above, one feature of the present invention is to provide the pre-tilting locally, in correspondence to the first and second electrodes, which are typically formed of a metal. Thus, there is interruption of the optical beam by the first and second electrodes and the provision of the first and second projections does not affect the optical properties of the liquid crystal panel. Walton is entirely silent about the foregoing feature of the present invention.

Lien, on the other hand, teaches a VA-mode liquid crystal display device having a projection (62) in a transparent pixel electrode (26') for inducing localized pre-tilting of the liquid crystal molecules. In the construction of Lien, the projection for causing

the localized pre-tilting is formed within a pixel area (D1, D2) in which spatial modulation of the optical beam takes places, and for this reason, the reference uses a transparent material for the step (64) as set forth in column 5, line 44 of Lien. Also, the pixel areas do not have a separation space between the electrodes, as in the claimed invention.

In the present invention, on the other hand, the projections are provided on (or behind) the electrode, typically made of low-resistance metal, and the electrodes leave a separation space in the pixels. Thus, it is not necessary to use expensive transparent material for forming these projections.

Thus, according to the present invention as set forth in claims 1 and 6, the pixel areas formed on the first substrate in the space between the first and second electrodes are free from projections, and the optical properties, particularly the transmittance, of the liquid crystal panel are not affected even when the first and second projections are formed on the first and second electrodes.

For the foregoing reasons, applicants believe that this case is in condition for allowance, which is respectfully requested. The examiner should call applicants' attorney if an interview would expedite prosecution.

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

In the Claims:

Claim 1 was amended as follows:

1. (Once Amended) A liquid crystal display device, comprising:

a first substrate;

a second substrate facing said first substrate;

a liquid crystal layer interposed between said first and second substrates; and

a group of electrodes disposed on said first substrate so as to create an electric field in said liquid crystal layer generally parallel to said first substrate in an activated state in which a drive voltage is applied to said group of electrodes;

said liquid crystal molecules aligning generally perpendicularly to a plane of said first substrate in a nonactivated state in which said drive voltage is not applied to said group of electrodes, said liquid crystal molecules aligning generally parallel to said plane of said first substrate in said activated state;

said liquid crystal molecules having a pre-tilt angle of less than 90° in at least one of a part of said liquid crystal layer corresponding to a pixel and said electrodes on said first substrate.

wherein said electrodes include a first electrode provided on a surface of said first substrate facing said second substrate and a second electrode provided on said surface with a separation from said first electrode, the separation creating a space which is part of the pixel, and wherein said liquid crystal display device further includes a first projection provided on said first electrode and a second projection provided on said second electrode, said first and second projections inducing said pre-tilt angle in said liquid crystal molecules located adjacent to said first and second projections.